

Orthodontic treating device and method of manufacturing same

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Abstract.

Original models of plaster are obtained from impressions of the dentition of the upper and lower jaws of a patient with malocclusion. The teeth are then separated from the base of the models and reset in wax to a normal occlusion. The realigned teeth are fixed in place with wax, and impressions of the upper and lower models are taken to duplicate the rearranged models, forming working models made of plaster. The working models are mounted on an anatomic dental articulator and a wax occluding model is constructed of the new occlusion to cover both upper and lower arches. The working upper and lower models, together with the wax occluding model are buried in plaster in a split cast. The wax occluding model in the split cast is heated and the wax is melted and discharged out of the cast. Silicone resin is then placed into the impression of the occluding model and cured.

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CUSTOM ORTHODONTIC APPLIANCE FORMING METHOD AND APPARATUS

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Abstract

A system (10) and method by which an orthodontic appliance (25) is automatically designed and manufactured from digital lower jaw and tooth shape data (26) of a patient (14) provides for scanning, preferably from a model (20) of the patient's mouth, to produce two or three dimensional images, and digitizing contours and selected point on the patient's teeth and jaw. From the scanned individual patient data, a computer (30) constructs archforms and calculates finish tooth positions, then designs an appliance (25), preferably including archwires and brackets, to move the teeth to the calculated positions. Lower teeth are positioned at the gums on an arch defined by the lower jaw bone and modified to best fit the tooth tips on a smooth curve. Then upper archforms are derived from the lower archform. Crown long axes of the teeth are derived and optimally inclined in the treatment which places all lower teeth but the cuspids in a plane and fits the occluding teeth to them. Overlaps for the upper incisors and cuspid rise are calculated. Brackets each have a base and an archwire support in which an archwire slot is to be cut to a custom inclination, depth, location and curvature, in a blank clamped to an inclinable holder, using a blade of a cutting machine (39). The holder and blade are moved by commands from a computer (30c). An archwire is automatically formed by a wire bender (40) into an optimize smooth arcuate shape and optimal low profile bracket design. Arch equations preferably start with a cubic spline equation and are converted to the form of a series of circle segments for machine control instructions for a numerically forming equipment. Placement jigs, simultaneously designed and automatically made with numerically controlled machinery (41) for positioning and orienting the appliance at connection points on the teeth, each have a surface custom shaped to the contour of a tooth. The machines (38-41) for making the brackets, wires and jigs are driven by commands derived from digitized tooth and jaw shape data and from digital representations of the tooth finish positions and appliance design.

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